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No. 240

THE N.A.C.A. CYH AIRFOIL SECTION

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Summary

The N.A.C.A. CYH airfoil section is described and its aero-dynamic characteristics are given as tested in the N.A.C.A. variable density wind tunnel at twenty atmospheres pressure. This section has a low drag, a high maximum lift, and a small travel of center of pressure.

The N.A.C.A. CYH airfoil section was developed from the Clark Y section by modifying the after portion in such a manner that the center of pressure travel is reduced, maintaining as far as possible the good characteristics of the Clark Y section. The development is shown in Fig. 1. The ordinates are given in Table I.

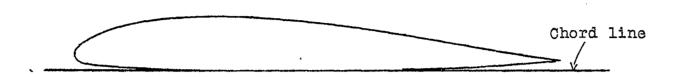
A plaster of Paris model airfoil was made and tested in the usual manner in the variable density wind tunnel at a density corresponding to twenty atmospheres pressure. The results are given in Table II and are plotted in Figs. 2 and 3. The drag coefficient, moment coefficient about the quarter chord point,

D/L values, and the angles of attack are plotted against lift coefficient in Fig. 2; and the center of pressure against lift coefficient in Fig. 3. The drag is low; the maximum lift high; and the center of pressure travel is small.

Curves of the minimum induced drag, the moment coefficient and the lift coefficient as calculated from the present aerodynamic theory are also shown in Fig. 2 for comparison.

The agreement of the moment coefficient curves is very good.

TABLE I.



N.A.C.A. CYH AIRFOIL SECTION
Ordinates in Fractions of Chord

| Sta. | .000 | .0125 | .025 | .050 | .075 | .10 | .15 | •20 | •30 |
|-------|--------------------|--------|-------|-------|-------|-------|--------|-------|-------|
| Upper | .0350 | .0545 | .0650 | .0790 | .0885 | .0960 | .10685 | .1136 | •1170 |
| Lower | .0350 | .0193 | -0147 | .0093 | .0063 | .0042 | •0015 | .0003 | •0000 |
| Sta. | •40 | • 50 | •60 | .65 | .70 | -80 | •90. | .95 | 1.00 |
| Upper | •11 4 0 | .10515 | .0915 | .0830 | .0741 | .0562 | .0384 | .0293 | .0205 |
| Lower | •0000 | .0000 | .0000 | .0000 | .0006 | .0038 | .0102 | .0140 | -0185 |

Radius of leading cdge - 0.015.



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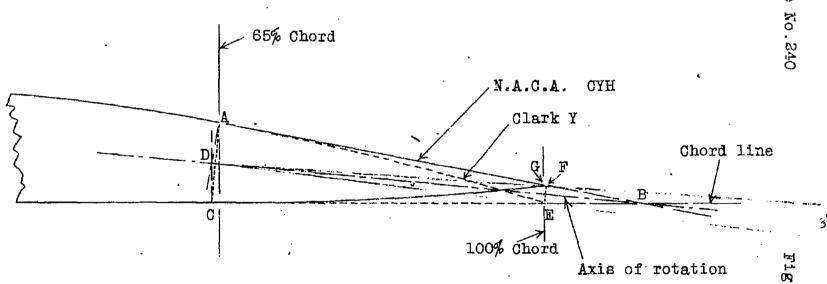
TABLE II.

Airfoil - N.A.C.A.-CYH Average tank pressure - 20.3 atm. Average dynamic pressure - q=633 kg/m² Average Reynolds number - 3,570,000

Span - 30 in. (76.2 cm) Chord - 5 in. (12.7 cm) Aspect ratio - 6 Material - Plaster of Paris

Average temperature - 33°C. Date - June 1, 1926. Angle Lift Drag Moment Center of Coefficient | Coefficient | Ratio | Coefficient of pressure % attack chord degrees D/L $C_{\rm M}$ (.25 chord) $c_{
m L}$ \mathtt{C}_{D} . from L.E. -6 -.219 -.026 .0158 -.072 13.0 -4.5-.114 .0131 -.175 -.034 -5.J. -3 .002 .0117 **5.**85 -.031 1173 -1.5 .111 .0114 .103 -.031 52.8 0 .230 .0133 .058 -.016 32.0 1.5 .342 .0164 .048 -.026 32.6 3 .454 .0217 .048 -.021 29.6 4.5 .562 .0279 .050 -.023 29.1 6 .667 .0351 .053 -.026 -28.9 7.5 .787 • 0458 -058 -.019 27.4 9 .891 .062 .0554 -.011 26.2 10.5 .989 .0674 .068 -.011 26.1 12 1.096 .0819 .075 26.7 -.019 13.5 1.189 .0971 .082 27.0 -.023 15 1.267 .1133 •090 -.034 27.7 16.5 1.302 .1310 .101 -.039 28.1 18 1.231 .161 .1989 -.049 29.0 19.5 1.196 .2231 .187 29.8 -.058 21 1.066 .2844 .267 -.080 32.3

Line AB was drawn tangent to upper camber of the Clark Y section at A, 65% of the cherd. Line BD was drawn bisecting angle ABC. The after part of the Clark Y section AEC was then rotated about line BD as an axis to the position CFA. With the trailing edge cut to G, making the chord 100%, the revolved section became the after part of the modified section, N.A.C.A. CYH.



. Fig.1 Development of the N.A.C.A. CYH airfoil section.

